4 Stormwater Master Plan

4.1 Introduction

This Stormwater Master Plan was prepared to document and compile previous work performed by the Center for Watershed Protection (CWP) in their preparation of the *Gordon Creek Baseline Assessment and Conservation Area Plan*. This master plan summarizes the stormwater and conservation priorities and recommendations made by the CWP into a framework for protecting the natural environment from stormwater impacts.

The Gordon Creek watershed is approximately 13.8 square miles of relatively undeveloped land, with small sections of residential land, a municipal waste transfer station, a closed landfill, two County parks, and an active open-pit aggregate mine. A combined elementary and middle school site was just completed, and two new residential developments are planned. Because of the largely undeveloped nature of the watershed, streams within the watershed were found to present good to excellent aquatic habitat (see Section 1.1). Proper management of stormwater with future development projects is critical to preserving the high quality streams, wetlands, and wildlife habitat in the watershed.

The Gordon Creek watershed includes 8 subwatersheds, as shown on Figure 1-2. This master plan includes recommendations for managing stormwater in each of the subwatersheds, and in the mainstem watersheds.

4.2 Current State of Stormwater Management in the Watershed

This section summarizes stormwater management requirements for new development in JCC, and current stormwater management practices in the Gordon Creek watershed.

4.2.1 Stormwater Management in James City County

The JCC Environmental Division is responsible for review and approval of stormwater management practices, for compliance inspections of stormwater management facilities during construction, and for maintaining an updated database of BMPs in JCC.

JCC has three ordinances regulating stormwater management:

James City County Code Chapter 18A: Stormwater Management: prohibits illicit discharges to the storm sewer system.

James City County Code Chapter 8: Erosion and Sediment Control: requires the control of erosion and sediment and includes measures to reduce stream channel erosion downstream of development projects. Erosion and Sediment Control plans must be submitted for all projects disturbing greater than 2,500 square feet and must conform to the *James City County Guidelines for Design and Construction of Stormwater Management BMPs (Guidelines)* and to the *Virginia Erosion and Sediment Control Regulations*, including minimum standards, and the *Virginia Erosion and Sediment Control Handbook.* Single family residences are exempt from submitting plans but must have an Agreement in Lieu of a plan and a site plan showing erosion control measures is required before issuance of a Building Permit.

James City County Code Chapter 23: Chesapeake Bay Preservation Ordinance: contains requirements for reducing pollutant loading associated with new impervious areas. The entire County is designated as Chesapeake Bay Preservation Area (CBPA); specifically a Resource Management Area, or RMA. Those lands having an intrinsic water quality function based on their ecologic and biologic characteristics are classified as Resource Protection Areas (RPAs) in accordance with Section 23-3. These include tidal wetlands, tidal shores, non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow, as well as a 100-ft buffer extending from the limits of each of these features.

In addition to the ordinances and guidelines listed above, JCC regulates and tracks stormwater management practices through the following measures:

- *Stormwater Drainage Conveyance Systems (Non-BMP Related) General Design and Construction Guidelines* (James City County Environmental Division, March 2001) provides design and installation criteria for private stormwater conveyance systems located outside VDOT right of way.
- *Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions* (James City County Environmental Division) is used to ensure that BMPs were designed and installed per JCC requirements and requires that as-built drawings be supplied to JCC to maintain their BMP database.
- *Special Stormwater Criteria (SSC) in James City County, Virginia* (Special Stormwater Criteria Task Group, December 14, 2004) provides additional stormwater criteria above the 10-point water quality requirement, and stream channel protection criteria to achieve two primary goals:
- Preserve pre-development hydrology to reduce impacts to high quality streams;
- Provide enhanced water quality treatment of stormwater runoff.

Additional information about the SSC in James City County is included in Section 4.4.2.4 of this report.

4.2.1.1 Stormwater Management Requirements

The CBPA requires review and approval of a stormwater management plan for all new development and redevelopment sites over 2,500 square feet. Single family lots that are not part of a larger plan of development are typically exempt. Stormwater management plans must include location and design of stormwater controls and best management practices (BMPs) conforming to the *James City County Guidelines for Design and Construction of Stormwater Management BMPs (Guidelines),* supplemented by the *Virginia Stormwater Management Handbook,* and "procedures for implementing non-structural stormwater control practices, and establishment of a long-term schedule for inspection and maintenance of stormwater management facilities"(JCC 2010).

Stormwater management requirements in JCC include the following:

- 24-hour extended detention of the 1-year, 24-hour storm even for stream channel protection.
- 10-Point BMP system for water quality compliance achieved through a combination of structural and non-structural controls.

4.2.1.2 Allowable Stormwater Practices

For a development project to achieve compliance with water quality regulations, the "…County currently allows over 20 structural BMP types, including wet ponds, wetland systems, infiltration practices, filtering systems, open channel systems, and extended dry detention facilities." Each approved treatment practice is assigned a score, with all sites required to achieve a minimum of 10 points. Points are also available for non-structural BMPs, including:

- Preservation of dedicated natural open space through conservation easements;
- Open spaces which accept or treat stormwater from a development site; and
- Conservation areas directly adjacent to targeted environmentally sensitive areas such as wetlands, mature forest, or RPAs.

4.2.1.3 Stormwater Practice Maintenance and Inspection

JCC requires an executed and recorded Declaration of Covenants – Inspection / Maintenance of Drainage System for all projects that involve the construction of stormwater management or drainage facilities, which are privately maintained. JCC requires facility-specific long term inspection and maintenance plans to be shown on the stormwater management plans for all stormwater management facilities.

JCC performs periodic BMP inspections during construction, and maintains a database of stormwater management practices in the County. JCC recently inspected BMPs countywide to identify potential problems in order to provide technical assistance to the BMP owners, to track on-going maintenance efforts, and to identify future BMP maintenance needs.

4.2.1.4 Watershed Education

James City County conducts watershed education through two websites, the Protecting Resources in Delicate Environments (PRIDE) program, which is the educational component of JCC's water quality program, and the County's overall website, www.jccEgov.org. The PRIDE program teaches residents about the importance of watershed protection while providing residents and neighborhoods with specific watershed restoration and protection tools. (JCC 2010) For example, the PRIDE website contains information on proper lawn care, downspout disconnection, and rain gardens. Homeowner's Associations can earn PRIDE designations for their neighborhoods by engaging in watershed protection activities like BMP improvement, stream restoration, or tree planting. JCC will also make presentations and provide information for Homeowner's Association about how to maintain stormwater facilities. The James City County website, www.jccEgov.org , provides information on BMP maintenance, volunteer efforts including water quality monitoring, floodplain management, and the County's stormwater program.

4.2.1.5 Watershed Maintenance

The JCC Stormwater Division has a drainage improvement program that works in partnership with property owners and residents to remedy drainage and erosion problems that are adversely affecting residents and/or County waterways. The Stormwater Division provides technical guidance and assistance and, where appropriate, may provide financial assistance in the design and implementation of improvements. Projects are prioritized and scheduled based on specific criteria and available funding.

To qualify for funding:

- The property must lie entirely within James City County.
- The problem must be located outside of the VDOT right-of-way.
- Prior to the use of any public funds, attempts will be made to resolve the problem within the private sector.
- The property must have an adequate maintenance/drainage easement, or the owner must be willing to grant such an easement.

4.2.1.6 Watershed Restoration

JCC's Capital Improvement and Maintenance Programs fund stormwater treatment/management and drainage related improvements. The fund has been used for the design and construction of regional stormwater facilities, stream restoration using natural channel design principles, and to address drainage problems. In cooperation with VHB, a Decision Support System (DSS) is being developed to assist JCC in prioritizing stream restoration and stormwater retrofit opportunities based on a suite of criteria, including weighing projected water quality and natural resources benefits against potential project constraints. These opportunities area identified as part of the County's Watershed Management Planning process,

which includes a detailed Baseline Assessment of watershed conditions via extensive fieldwork to characterize existing conditions along stream corridors and at stormwater treatment facilities.

4.2.1.7 Stormwater Management Practices in the Gordon Creek Watershed

The Gordon Creek watershed is predominantly undeveloped, and as such has limited stormwater best management practices in place. Single family residential homes were constructed without stormwater controls. The Green Springs Mobile Home Park and Deerwood Hills are the only built out subdivisions in the watershed, and were constructed without stormwater BMPs.

The newly constructed Matoaka Elementary School has a BMP sized for larger storms, exceeding JCC requirements. The J. Blaine Blayton Elementary and adjacent Lois Hornsby Middle Schools recently opened. Special Stormwater Criteria (SSC) designation was applied to this site, requiring the installation of a minimum of seven measures, including bioretention, swales, and similar related to recharge and water quality. BMPs for quantity mitigation were sized to exceed JCC requirements so that post-development flows did not exceed predevelopment flows for storms up to and including the 100-year storm event to ensure no degradation to the already fragile Jolly Pond Road Dam. These BMPs also provide irrigation water for the sports fields.

Several residential developments have been discussed for the Gordon Creek watershed. Ford's Colony Section 35A will be located off Centerville Road and will include multiple BMPs. This development was designed using on-site low impact development (LID) practices, and has comprehensive on-lot stormwater management requirements through the covenants for new home construction. Liberty Ridge is located just north of the proposed Ford's Colony Section 35A.

4.3 Overview of Stormwater Priorities in the Gordon Creek Watershed

The following section summarizes the CWP findings of the five priority stormwater management objectives guiding the development of this master plan. These include:

- Protection of Specific Stream Reaches from Accelerated Channel Erosion
- Protection of Conservation Area from the Impacts of Stormwater Runoff
- Wetlands Protection from the Effects of Altered Water Level Fluctuation
- Special Stormwater Criteria (SSC) for New Development
- Retrofitting of Existing Facilities and Uncontrolled, Old Development

4.3.1 Protection of Specific Stream Reaches from Accelerated Channel Erosion

The *Baseline Assessment and Conservation Area Plan* includes a stream reach scoring system that determined the streams in the watershed to be in "good" or "excellent" condition. As development occurs in JCC it is important that these classifications are protected. JCC's Erosion

and Sediment Control Ordinance requires 24-hour extended detention of the 1-year, 24-hour storm event as its stream channel protection design criteria. This replaces the State's requirement to demonstrate natural channel adequacy in a 2-year, 24-hour storm event.

4.3.2 Protection of Conservation Areas from the Impacts of Stormwater Runoff

Of the six conservation areas recommended by the CWP in their baseline assessment, the particularly high-quality streams of C4 and C5 were noted as being potentially sensitive to development pressure, as was the mainstem of Gordon Creek at C1, which was noted as containing a bald eagle nest (Figure 1-7). However, no rare, threatened, or endangered species were noted as being susceptible to potential changes in hydrologic regime which may be brought about by residential development.

Though the Liberty Ridge subdivision (which lies adjacent to conservation area C4) does not include the application of SSC, stormwater generated from these minimum three-acre lots is controlled for water quantity using structural BMPs. Future phases of this subdivision will not be required to employ SSC.

4.3.3 Special Stormwater Criteria for New Development

The Gordon Creek watershed contains numerous high quality streams and wetlands, as well as conservation areas deserving high levels of protection. JCC's SSC was developed to protect these resources by requiring more stringent stormwater controls in sensitive areas than are required elsewhere in the County. Additional information about the SSC program's goals and criteria is included in Section 4.4.2.4.

4.3.4 Retrofitting of Existing Facilities and uncontrolled, Old Development

The Gordon Creek watershed is primarily undeveloped; therefore there are limited retrofit opportunities. Refer to Section 1.2 for information on the retrofit locations that were identified by the CWP.

4.4 Stormwater Master Planning Methodology

The following sections summarize the methods used to determine subwatershed boundaries, and the stormwater strategy categories used.

4.4.1 Subwatershed Delineation

The Gordon Creek watershed contains eight subwatersheds, which were delineated by the CWP in coordination with technical staff from JCC using topographic and hydrographic information provided by JCC. Subwatershed delineation did not proceed in a manner typically used for hydraulic and hydrologic analysis, but rather to best compartmentalize the watershed with respect to land use planning. For example, Subwatershed 201 (Figure 1-2) incorporates the mainstem of Gordon Creek corresponding to the extent of the general pool elevation in Jolly Pond and does not include significant contributing drainage areas.

4.4.2 Development of Subwatershed Strategies

Stormwater strategies for each of the subwatersheds fall into one of four categories as described below.

4.4.2.1 No Action

This category applies to areas where additional stormwater protection is not necessary either because existing controls are adequate or there is limited opportunity for future development. Because of the extent of wetlands in the Gordon Creek watershed, there are few areas where this category is applicable.

4.4.2.2 James City County Standards for On-Site Stormwater Management

This category describes areas where current County standards should be applied to future development. JCC has detailed stormwater management criteria that appear adequate to protect downstream areas from erosion, as well as provide proper water quality treatment.

4.4.2.3 Stormwater Retrofitting and Regional Stormwater Management

This category applies to areas where regional best management practices can be used to serve a large area of development, or where existing development can be retrofitted to provide stormwater controls. The Gordon Creek watershed is primarily undeveloped so retrofitting opportunities are limited. Retrofit locations were discussed in Section 1.2. Regional BMPs may be feasible; however current methods of development in JCC typically focus on small distributed stormwater management practices. Discussions with JCC indicate that regional BMPs are not desirable in the Gordon Creek watershed because of the relatively pristine condition of the watershed.

4.4.2.4 Special Stormwater Criteria (SSC)

This category applies to areas with sensitive environmental habitat that require more stringent stormwater controls to minimize impacts from future development. The Gordon Creek watershed includes stream channels classified as "good" to "excellent" according to the CWP. The watershed also contains large areas of contiguous forest, rare and threatened endangered species habitat, and high quality wetlands.

JCC adopted SSC in 2004 with two primary goals. The first is to preserve pre-development hydrology, including groundwater recharge, to reduce impacts to high quality streams. The recharge potential of an area depends on groundcover, slope, soil type, and precipitation, and evapotranspiration. Sites with natural groundcover, such as forests and meadows, have higher recharge rates, less runoff, and greater transpiration losses under most conditions. This helps to preserve existing water table elevations thereby maintaining the hydrology of stream and wetlands during dry weather (JCC 2004). Increases in impervious areas decrease recharge rates.

The second primary goal is to provide enhanced water quality treatment of stormwater runoff through the use of Better Site Design (BSD), which promotes the use of distributed stormwater

management practices and limiting impervious area. BSD can significantly reduce water quality and hydrologic impacts resulting from development (JCC 2004). Additional information about JCC's initiative for better site design is included in Section 3.3 of this report.

SSC is applied to development plans in the following situations:

- SSC Type 1: Watershed Management Plans. SSC designation is placed on development projects, in whole or part, when the site is located in a defined SSC area consistent with an approved watershed management plan.
- SSC Type 2: Variance Process. SSC designation is placed on development projects, in whole or part, as part of mitigation or compensatory condition placed on the project as a result of the granting of a waiver or exception to JCC's Chesapeake Bay Preservation ordinance or Erosion and Sediment Control ordinance.

Given the undeveloped and pristine nature of the Gordon Creek watershed, SSC should be applied across the entire watershed.

Subwatershed strategies with respect to stormwater management are presented in Chapter 6, Subwatershed recommendations are provided in the context of each of the four stormwater strategies discussed above.

4.5 Stormwater Framework for Gordon Creek Watershed

The following section summarizes watershed-wide observations and sets the framework for implementing the subwatershed and watershed-wide recommendations included in earlier sections.

4.5.1 Watershed-wide Stormwater Programmatic Observations

The Gordon Creek watershed is primarily undeveloped and as such has minimal stormwater management practices in place currently.

James City County has a comprehensive watershed education plan through the PRIDE program that can be tailored to the specific needs of the Gordon Creek watershed as noted in the October 2007 Gordon Creek stakeholder meeting (see Appendix B). Needs identified at this meeting include infiltration, tree preservation for forestry, and agricultural operations. The stakeholders also identified the need for HOA's within the watershed to make residents aware of the watershed they live in and what they can do on their lots. There is currently no watershed-specific group for Gordon Creek similar to the Friends of the Powhatan Creek.

4.5.2 Stormwater Treatment Practices

This draft Gordon Creek Watershed Management Plan includes a suite of 17 Strategic Actions. Those actions related to stormwater treatment practices are discussed below.

Priority #3 - Strategic Action: *Implement Special Stormwater Criteria for all new plans for development (except those with approved plans or in review).*

As stated previously, the Gordon Creek watershed is largely undeveloped, and includes high quality stream, wetland, and upland habitat. JCC should apply the SSC designation across the entire watershed to provide a higher degree of protection for sensitive areas. County requirements currently allow for the SSC designation when included in an approved Watershed Management Plan.

Priority #6 - Strategic Action: *Continue to fully implement the requirements of the County's MS4 permit in relation to watershed management throughout the County.*

JCC is required to have a Virginia Stormwater Management Program (VSMP) permit to discharge stormwater into local waterways. The specific permit is referred to as the Municipal Separate Storm Sewer System (MS4) General permit and is issued by the Virginia Department of Conservation and Recreation. The six minimum control measures required in the stormwater management plan are consistent with the Watershed Goals and Strategic Actions for Gordon Creek, and effectively provide further support for responsible watershed planning and stewardship. The six minimum control measures are:

- Public Education and Outreach on Stormwater Impacts;
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination (IDDE)
- Construction Site Stormwater Runoff Control
- Post-Construction Stormwater Management in New Development and Redevelopment; and
- Pollution Prevention/Good Housekeeping for Municipal Operations.

The County also has a seventh minimum control measure to address special conditions of the federal Total Maximum Daily Load (TMDL) program. Each minimum control measure has one or more requirements that JCC will have to accomplish as part of its stormwater management program. To meet these requirements, JCC has proposed structural and non-structural best management practices (BMPs) to help reduce the amount of stormwater pollution entering local streams. Some examples illustrating the breadth of these BMPs include:

- Provide soil testing and nutrient management plans directly to property owners in order to reduce the unnecessary use of fertilizers;
- Educate public employees, business owners, and homeowners on hazards and legal implications of illegal discharges and improper disposal of waste;
- Provide equipment and training to citizens interested in monitoring the biological health of County water bodies;
- Encourage the use better site design (BSD) as appropriate to local/regional conditions;

- Continue to receive and respond to information from citizens relating to the County's erosion and sediment control program through personal visits, email, telephone, and the County's web page; and
- Update mapping of all public and privately owned structural stormwater controls with reference to the appropriate watershed and any impaired waters in drainage area.

Priority #13 - Strategic Action: *Conduct additional feasibility assessments, validate, and carry out the stormwater retrofits identified in this watershed plan*.

JCC should develop a plan for implementation of the stormwater retrofits outlined in Section 1.2 of this report, considering the recommendations provided in that same section to verify the prioritization of the projects. A draft Strategic Action Plan and cost estimate for each of the five retrofits is provided in Chapter 5.